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Preparation and Characterization of Flaxseed Oil-Based Emulsion Containing Kojic Acid

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Structured Abstract

Background: Flaxseed oil and kojic acid are widely used in cosmetics industry due to their various benefits. However, kojic acid is a hydrophilic skin whitening agent, making it difficult to penetrate into and transport to a certain location of the skin.Thus, a carrier for kojic acid such as an emulsion system needs to be developed.Unfortunately, emulsion also has its own problem due to its thermodynamic instability. Therefore, this study was proposed to prepare and characterize a stable flaxseed oil-based emulsion as carrier for kojic acid.

Methods: The flaxseed oil (O) was tested for moisture and fatty acid contents. Then it was combined with water (W) and surfactants (S) with compositions of 28:57:15 (O:W:S) for Formulation 1 (F1) and 40:40:20 (O:W:S) for Formulation 2 (F2). The two formulations were tested on their stability via centrifugation test and freeze-thaw cycle. The more stable formulation was then characterized for its pH value, particle size, electrical conductivity and zeta potential.

Results: The physicochemical properties of flaxseed oil showed moisture content of 0.5699% with free fatty acid content of 0.2490%. From the centrifugation test, F1 produced a stable one-phase emulsion while F2 produced an instable two-phase emulsion. Then, F1 was subjected to freeze-thaw cycle and it was stable after the completion of the 6 freeze and thaw cycles. Next, F1 was tested for its particle size and polydispersity index when produced via low shear (LS) and high shear (HS) homogenization methods. The particle size of the emulsion when prepared via LS homogenization was found to be 790.0 nm with polydispersity index of 0.525 and 190.0 nm with polydispersity index of 0.707 under HS homogenization. The surface charge of F1 was found to be -38.1 mV and pH 6.21 and 5.49 on day 1 and 35, respectively. The low electrical conductivity value of F1 (0.0183 mS/cm) indicates that the emulsion is water-in-oil (W/O) emulsion as oil is a poor electric conductor.

Conclusion: As a conclusion, a stable flaxseed oil-based emulsion as carrier for kojic acid was successfully prepared, characterized and suitable to be the carrier for kojic acid.

Keywords: Emulsion, flaxseed oil, Kojic acid, surfactants

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